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Annual Report

FOREST PEST CONDITIONS IN WISCONSIN

1963

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WISCONSIN CONSERVATION DEPARTMENT

FOREST MANAGEMENT DIVISION

FOREST PESTS — SURVEY AND CONTROL

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A N N U A L R E P O R T

FOREST PEST CONDITIONS

IN

WISCONSIN

1963

INTRODUCTION

The Forest Pest Survey and Control Section takes this opportunity to express its appreciation for the support of the program and information contributed by Forest Management and other Department personnel, and by many other cooperators who in one way or another are helping to clarify the status of our major forest pests and their associated organisms. Those working in various fields of forest pest research, or who are participating in surveys or who report observations made during the course of their work all contribute to the increasing fund of knowledge which will help us to better understand and cope with our problems.

The 1963 season presented many pest problems, some of which are becoming familiar, and a few new ones have appeared. The extended hot, dry periods which occurred over much of the state during the summer resulted in increased activity of some pests, and affected some adversely.

The pine tussock moth was perhaps the most serious problem insect, destroying about 80 acres of timber in Douglas and severely damaging another thousand acres. In spite of an apparent marked increase in parasitism and predation of all its stages, a large number of the insects went into hibernation to present a serious threat to more timber in the spring of 1964.

The Saratoga spittlebug required control on a few hundred acres, mostly in plantations which had not had high enough populations to warrant control in 1962. The hot, dry weather in June and July apparently had caused nymphal mortality in some localities permitting a reduction in the acreage requiring control.

Webworm population were increasing in the hardwoods along the western end of Menominee County and could lead to another "maple blight" situation.

Pine tortoise scale infestations became serious in a few localities in northern counties, with the most severe infestation occurring in Bayfield County.

Walkingstick and oak grasshopper defoliation did not materialize to the extent anticipated from 1961 egg counts. Areas of defoliation were much smaller and more widely dispersed but a few new spots appeared.

Balsam gall midges are becoming an increasingly serious problem to Christmas tree growers in some northeast counties, while those in the central sandy areas are plagued with root collar weevil, pine root weevil, and pales weevil, especially in Scotch pine stands.

Austrian pine growers are finding their trees rendered unmarketable by pine needle blight, Dothistroma pini Hulbray. The damage to Austrian pine had previously been attributed to winter injury in most instances, and many thousands of trees are presently in extremely poor condition.

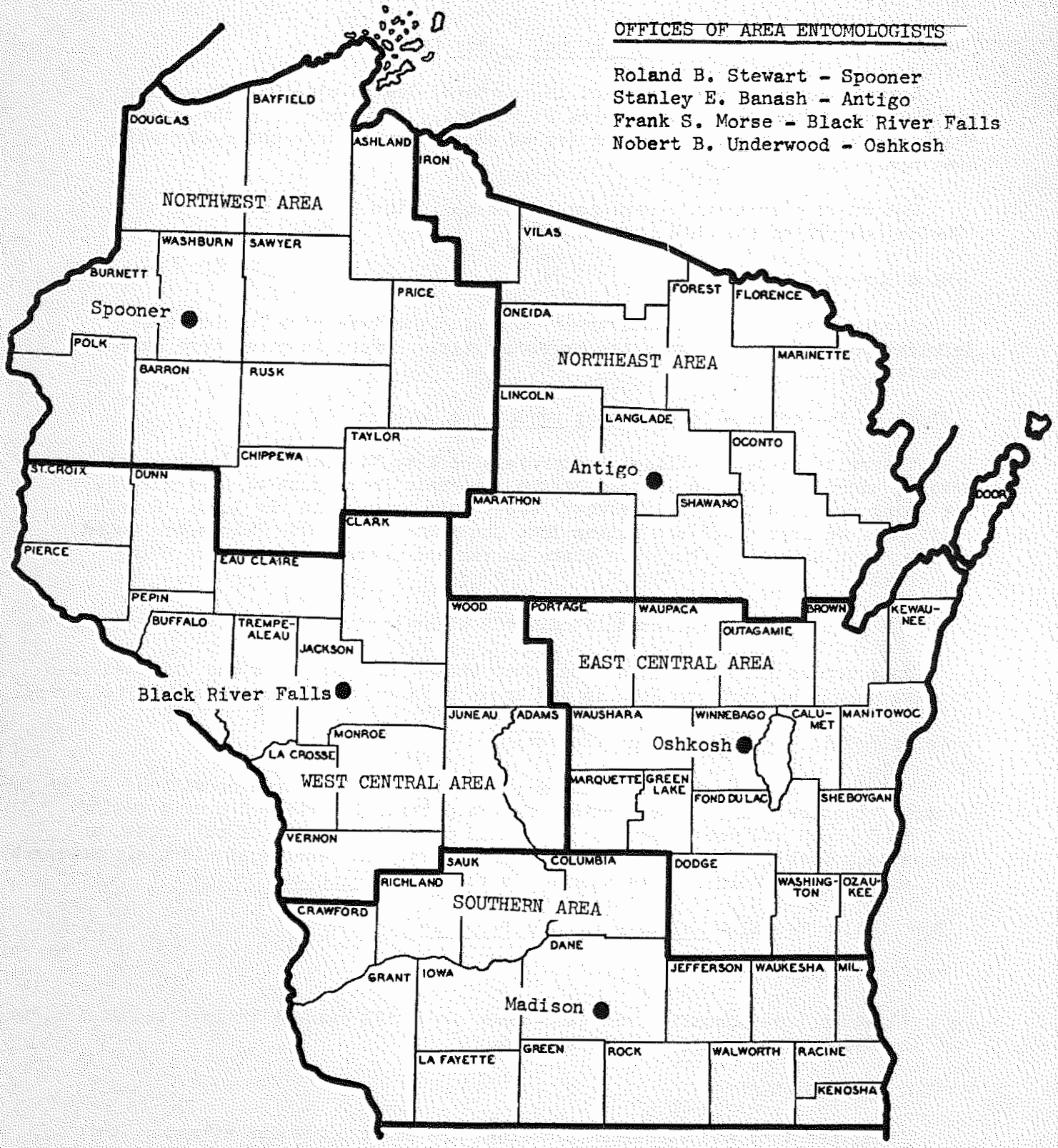
Information on numerous other pests brought to the attention of the Forest Pest Survey and Control Section, and Phenological Notes on most insects and diseases reported may be found on the following pages.

FOREST PEST [illegible] ONTROL HEADQUARTERS

Nevin Fish Hatchery, Madison

OFFICES OF AREA ENTOMOLOGISTS

Roland B. Stewart - Spooner
Stanley E. Banash - Antigo
Frank S. Morse - Black River Falls
Nobert B. Underwood - Oshkosh



MAJOR FOREST INSECTS

COLEOPTERA

Strawberry Root Weevil - Brachyrhinus ovatus (Linnaeus)

Larvae and pupae were observed in scattered Scotch pine Christmas tree plantations in the West Central Area in May while root damage in the stands was being investigated. Large numbers of adult weevils were observed in the same plantations on June 19.

The weevils apparently were not a problem in the Ripco Nursery (Oneida County) as they had been in 1962.

Wood Borers - Cerambycids

Borers were active in some trees weakened by severe pine tussock moth defoliation in Douglas County the previous year. Borers in pines were scarce elsewhere in the state.

Black Hills Beetle - Dendroctonus ponderosae Hopkins

Shipments of beetle-killed ponderosa pine into Wisconsin during the dormant season, under limitations imposed by the Wisconsin Department of Agriculture, are being observed to determine what insects are present in the logs. Sample sections from logs which are coming into the state from South Dakota are caged at the Nevin Hatchery Laboratory where larvae and emerging adults are being collected.

The pulp logs are utilized immediately after arrival at the mill.

Wood coming into Wisconsin from other states in past years and utilized in a similar manner has not resulted in any known problems in Wisconsin's forested areas.

Pales Weevil - Hylobius pales (Herbst)

The pales weevil is recognized as a pest in Christmas tree operations in the central counties. Extensive plantations are partially harvested over a period of 3 to 5 years and weevil populations build up on the stumps of cut trees, and then attack both tops and roots of residual trees. University of Wisconsin research is clarifying the roles of the species in the genus Hylobius.

Root Collar Weevil - Hylobius radicis Buchanan

NORTHWEST AREA

Although tree mortality and wind-throw are still evident in infested stands, the incidence of damage is relatively low.

WEST CENTRAL AREA

Christmas tree and windbreak plantings are under continued attack. Scotch pine is a primary host, but several acres of red and jack pine plantings have been damaged by the weevil in the Eau Claire County Forest.

EAST CENTRAL AREA

The incidence of this insect has decreased in many localities due to mortality of the host trees. Increasing incidence in new areas where Scotch pine is being planted for Christmas trees was reported from Waushara, Marquette, Green Lake, Portage and Waupaca Counties. The highest number of larvae found on a single tree was three.

Elsewhere in the state evidence of infestations is found in scattered locations in the sandy soil areas.

Pine Root Weevil - Hylobius rhizophagus Millers

NORTHWEST AREA

In some heavily infested stands populations appear to have declined. Little new tree mortality has occurred. A few previously unreported infestations which apparently had been active for several years, most of them in poor-growing jack pine plantations, were disclosed in Washburn County.

WEST CENTRAL AREA

Central Wisconsin pine plantations appear to be suffering more damage from this insect than any other pest. New areas of damaged jack pine have been located in Eau Claire, Jackson, Juneau, Adams and Wood Counties.

EAST CENTRAL AREA

Reports of new areas of infestation are increasing. Populations are generally higher in and adjacent to old Scotch pine plantations. Larvae were found congregated at the base of infested trees in Portage County early in November. Thirteen larvae were collected from a single seven year old red pine. Infested areas were also found in Green Lake, Marquette, Waushara and Waupaca Counties.

- Phenological Notes -

June 17 - Larvae were found readily on symptomatic Scotch pine in a Jackson County plantation (T19N R4W, Sec. 33, S1/2).

American Elm Bark Beetle - Hylurgopinus rufipes (Eichhoff)

NORTHEAST AREA

Elm tops were examined during the spring and fall at several locations in Shawano, Menominee, Marathon and Langlade Counties. Larvae of the beetle were found at all locations in relatively small numbers. Tops of felled trees which had been on the ground a year or less had the most native elm bark beetle larvae while wood which had been down two years or more contained no active larvae.

EAST CENTRAL AREA

There was much evidence of old galleries in trees growing in areas of fluctuating water tables but little evidence of current attacks. The largest beetle populations were in Winnebago, Outagamie, and part of Waupaca Counties.

Pine Bark Beetles - Ips sp.

NORTHWEST AREA

Extremely dry conditions during the summer increased the susceptibility of trees to attack and populations appeared to have increased throughout the jack pine type. Scattered trees were killed throughout the area but no concentrations of tree mortality were noted. A red pine stand in Douglas County, thinned during the summer, lost some of the remaining trees.

NORTHEAST AREA

Bark beetles were active in several counties, but reports of damage were most frequent form Lincoln, Langlade and Oneida Counties. The beetles were most destructive in young red pine plantations where patches of trees were killed and peripheral trees were severely attacked by high populations.

WEST CENTRAL AREA

Bark beetle damage was more prevalent in 1963 than it was the previous year. A dry summer contributed to the build-up of high populations early in the season in slash and left residual stems weakened and susceptible to further attack by later generations of emerging beetles. Advance jack pine reproduction was destroyed in a Jackson County cutting area, and a red pine plantation early in the summer suffered some tree mortality.

SOUTHERN AREA

Pockets of dead trees continued to enlarge during the dry summer in some red pine plantings on limestone ridges with a shallow soil cover.

Black Elm Bark Weevil - Magdalis barbita (Say)
Red Elm Bark Weevil - Magdalis armicollis (Say)

Increasing incidence of attack by these species has been observed in Sheboygan, Fond du Lac, Winnebago, Waushara, Waupaca and Outagamie Counties. Although these insects have not been implicated in transmitting Dutch elm disease they contribute to further weakening of decadent elms. M. barbita has been reported breeding in hickory attacked by the hickory bark beetle, and has also been observed in recently killed walnut and oak.

Specimens of the weevils collected at Ripon on March 14 were identified at the Agricultural Research Service Laboratory, Beltsville, Maryland.

A small flatheaded borer, Anthaxia viridifrons Lap., has been found in association with the two species of weevils.

Two species of parasitic wasps were recovered from elm wood collected in Menominee County in the fall of 1963. Large numbers of M. barbita and a lesser number of M. armicollis emerged from the wood during the same period as the parasites were emerging. One of the wasps, Eubadizon rotundiceps (Cresson), is known to be parasitic on species of Magdalis, and possibly is a first record for Wisconsin. The other wasp, Spathius simillimus Ashmead, apparently has not been reported in Wisconsin previously.

Identification of the parasitic wasps was made by Dr. R. D. Shenefelt of the Department of Entomology, University of Wisconsin.

Locust Borer - Megacyllene robiniae Frost

High populations of this insect in the east central counties prevent the development of good stands of black locust and relegate the species to a "weed tree" status in most of the area.

White Grubs - Phyllophaga sp.

The adult flight was light and extended over a long period due to unusually cool nights in the West Central Area. No reports of serious grub damage were received from anywhere in the state.

Insecticide trial plots were established in a Juneau County plantation at planting time. Examination of the plots in the fall revealed that tree mortality in untreated rows due to grub damage averaged 2.5% while another 18.5% of the untreated trees died from drought and other unidentified causes. On plots treated with aldrin, chlordane and heptachlor at several application rates, tree mortality due to grubs averaged 0.15% and all other mortality averaged 13.7%.

White Pine Weevil - Pissodes strobi (Peck)

NORTHWEST AREA

Populations increased significantly over most of the area, particularly in jack pine. In many Douglas County stands up to 20% of the leaders were killed. Both natural stands and plantations were infested.

NORTHEAST AREA

Weevil infestations were generally light in most counties. However, some plantings in Oconto and Marinette Counties had up to 16% of the white pine terminals weeviled.

Infestations in red and Scotch pine plantings were reported from Forest, Marinette, Menominee, Oconto and Shawano Counties. In a young red pine planting in Menominee County 40% of the terminals were attacked by the weevils, and at other locations some damage occurred in roadside plantings of red pine. Damage to some young Scotch pine plantings was severe in Shawano County.

WEST CENTRAL AREA

Up to 30 to 40% of the trees in the most susceptible white pine stands in some counties were infested and damage generally continued at levels comparable to those of recent years.

DDT sprays were applied to white pine terminals on 26.5 acres of Clark County Forest trees under the supervision of the area entomologist. The treatment was applied in April. Subsequent evaluation indicated that less than one percent of the trees in the treated area became infested while 18% of those in nearby untreated stands were damaged. Another plantation was treated with DDT in La Crosse County by the owner with good results.

Lindane-aroclor sprays were applied to terminals of white pine on 48 acres in the Jackson County Forest in November to test the effectiveness of fall treatment. The treatment is to be evaluated in 1964.

EAST CENTRAL AREA

Populations are low in most white pine areas. However, many trees have been damaged so extensively by past weevil activity that they constitute a liability rather than an asset. Although treatment with lindane and other materials can be effective, many people are reluctant to spray. Mechanical control or cultural control can be helpful in reducing the weevil population.

- Phenological Notes -

April 11 - Adult weevils on white pine terminals. Juneau County, T16N R3E,S 33, NWNW.
April 15 - Adults feeding, mating on white pine. Temperature 70°F., Clark County, T27N R4W, S 35, SWNE.
April 17 - Adults first observed feeding in Burnett County.
May 6 - Adults were active and feeding punctures numerous in Langlade County.
May 7 - First oviposition observed in Polk County.
May 9 - Weevils were active on terminals of white and jack pine in Langlade and Forest Counties.
August 2 - Adult emergence first noted in Langlade County.
August 15- Adult weevils active in Oconto County plantations.

Weevil - Sciaphilus asperatus (Donsd.)

High adult populations in parts of Langlade and Menominee Counties caused conspicuous defoliation on hardwood reproduction and herbaceous species in wooded areas. The insects were actively feeding on foliage from mid-August until killing frosts occurred.

Smaller European Elm Bark Beetle - Scolytus multistriatus (Marsham)

A marked reduction in populations occurred generally over Sheboygan, Fond du Lac, Washington, Dodge and Winnebago Counties. This was attributed partially to the severe winter of 1962-1963, and perhaps reduced the incidence of disease in the counties mentioned.

Elm trees around the Wade House in the Southern Unit of the Kettle Moraine State Forest were sprayed to protect them against the beetles. Samples of twigs were collected from three suspect trees and sent to the Wisconsin Department of Agriculture in Madison. Two trees produced negative tests for the disease, the third tree proved to be infected and was promptly removed.

A Scarab Beetle - *Strigoderma* arboricola (Fabricius)

The beetles were numerous on the new growth of white pine during early May in Green Lake County, but no damage was noted. This insect has been numerous periodically in sandy soil areas where it has been observed feeding on buds and flowers of roses, milkweed, soybeans, and water lilies. Little is known about the larval habits.

DIPTERA

Balsam Gall Midge - Cecidomyia balsamicola (Lintner)

Many balsam stands throughout the northeast counties were heavily infested by a gall midge. Balsam fir plantings in Langlade and Shawano Counties were more severely damaged than elsewhere, and Christmas tree growers are expressing increasing concern over the injury which affects the salability of their product.

A planting of Abies fraseri (Pursh.) Poir in Langlade County appears to be free of infestation by the midge although it is growing adjacent to heavily infested native balsam.

Chemical control was attempted with limited success on selected infested trees at various stages of budbreak. Most effective control was achieved when the number of open buds did not exceed 5% of the total buds. Test material used included phosphamidon, lindane, DDT, and methoxychlor. Applications were made with a mist blower, and it appears that timing of application is critical.

- Phenological Notes -

May 16 - Oviposition reached a peak as indicated by activity and numbers of midges. Unidentified hymenopterans, probably parasites, were observed ovipositing along with the midges. Weather conditions such as late frosts adversely affect the success of oviposition.
June 2 - Galls were becoming discernible on the balsam needles.
December 10 - Gall midge larvae, apparently parasitized, were still in some needles remaining on the trees.

Red Pine Needle Midge - Thecodiplosis piniresinosae Kearby

Populations were low over the entire state. No damage was reported.

Pitch Midge on Jack Pine -

Midge populations were high again especially in parts of Douglas and Bayfield Counties. Severe twig mortality has occurred in some localities and two years of heavy infestation has resulted in tree deformity.

Midge infestations have frequently been observed in West Central Area jack pine stands infested by pine root weevils. It appears that the midge occupies adult weevil feeding scars.

HEMIPTERA

Saratoga Spittlebug - Aphrophora saratogensis (Fitch)

NORTHWEST AREA

Nymphal surveys on susceptible red pine plantings indicated populations were at a very low level, as they have been the past several years.

NORTHEAST AREA

Approximately 12,000 acres of susceptible red pine plantations on county, state, private and industrial forest lands were surveyed in eight counties. Nymphal surveys indicated that about 800 acres of plantations were in need of chemical control. Most of these were plantations which had been omitted from the control program in 1962 because populations were not quite high enough then to warrant treatment.

An extended period of hot, dry weather in late June and through most of July prompted re examination of plantations scheduled for treatment, with the result that 76 acres of Florence County Forest Crop lands and 25 acres of Consolidated Papers, Inc., lands were dropped from the control plans when it was found that the spittlebugs had perished. Nymphs had been able to survive to maturity only in areas of dense sweetfern cover.

The Ueding Flying Service of Vincennes, Indiana, was the successful bidder on the chemical control contract at a bid price of $2.24 per acre for the insecticide and its application. DDT in oil solution was used at the rate of one pound in one gallon of spray per acre on the following acreage and costs were shared as indicated:

1963

County and Owner	Acreage Sprayed	Cost to Owner	Cost to State	Total Cost
Marinette County:				
County For st Crop Lands	550	$436.80	$ 795.20	$1,232.00
Lapointe p lanting (private)	10	-	22.40	22.40
Amberg School Forest	5	-	11.20	11.20
Oneida County:				
Nekoosa-Edwards Paper Co.	109	-	244.16	244.16
D. A. Stenz planting (private)	81	-	181.44	181.44
Totals	755	$436.80	$1,254.40	$1,691.20

Personnel from the Wisconsin Department of Agriculture, General Laboratory Division sampled vegetation at various levels from mineral soil into the tree crowns within the sprayed areas to study the distributicn of insecticide deposit.

Reexamination of 85 acres of plantations treated in 1962 with back-pack mist blowers in Marinette and Oneida Counties indicated that the effort had been highly successful.

WEST CENTRAL AREA

The insect was a problem in Jackson County for the first time in several years. Two plantations, one of 17 acres and the other 15 acres, had high nymphal populations which, according to survey standards, needed treatment. A Hurricane mist blower was used to apply DDT at the rate of one pound per acre on July 16.

Egg surveys and observation of feeding scars in the fall indicated that additional acreage will have flagging, and more extensive treatment may be required in 1964.

EAST CENTRAL AREA

Two spittlebug infestations were reported - one in Waupaca County at the Shawano County line, and another in Brown County adjacent to Oconto County. No treatment was required.

- Phenological Notes -

May 9 - Eggs were swelling on elongating buds in Langlade and Forest Counties.

May 27 - About two-thirds of the eggs were hatched in Marinette County. Some eggs were blackened and appeared to be parasitized.

June 20 - Most nymphs were in the third instar in Vilas County (Northern Highland State Forest).

June 26 - Most nymphs were in the third instar and some in the fourth in the vicinity of Dunbar (Marinette County).

July 2 - Failure of nymphs to survive hot, dry weather was observed in parts of Lincoln and Oneida Counties. Most annual plants had dried-up in these localities.
July 20 - Approximately 97% of the nymphs had transformed to adults in Marinette County.

Pine Spittlebug - Aphrophora parallela (Say)

NORTHWEST AREA

Infestations were generally heavy in the Town of Sterling in Polk County. Spittle masses covered the entire upper parts of tree trunks in T36N R20W, Section 8, SWSE.

WEST CENTRAL AREA

Spittle masses were commonly observed on jack pine in Adams, Juneau, Jackson, Monroe and Wood Counties.

EAST CENTRAL AREA

Infestations were heaviest on Scotch pine. Insecticides, applied by airplane, were used to control the nymphs in a high-value, heavily infested Christmas tree plantation. Methoxychlor and malathion were used at the rate of one-half pound of each material in three gallons of water per acre. Excellent control was achieved.

Although the insect was frequently observed in other parts of the state, it did not create any real problems.

- Phenological Notes -

June 20 - Adults were first observed in Polk County.

Pine Tortoise Scale - Toumeyella numismaticum (Pettit & McDaniel)

NORTHWEST AREA

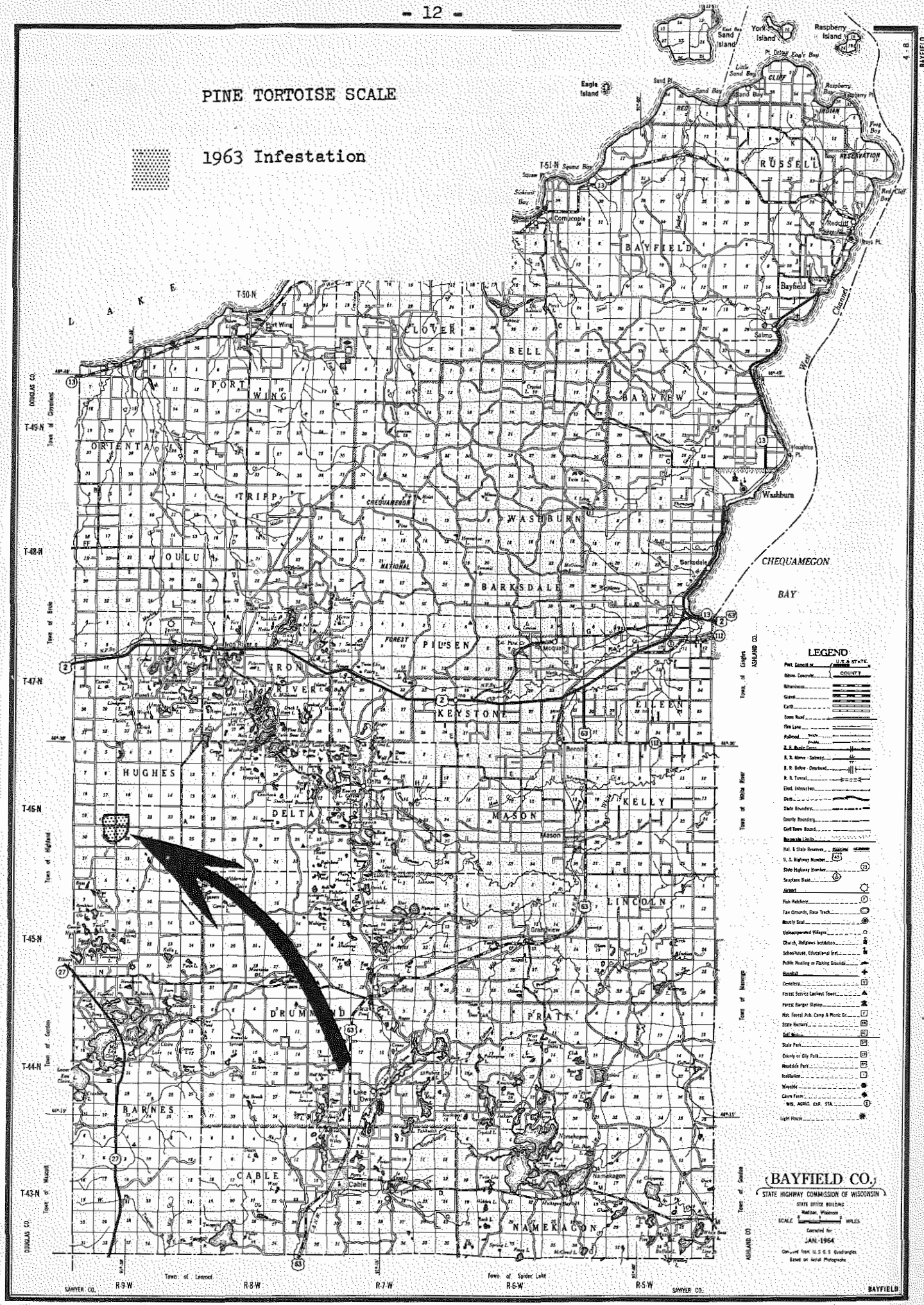
An increase in the size and intensity of some localized infestations was observed in the fall of 1963. A heavy infestation in Bayfield County covers about 400 acres in parts of four adjoining sections (T46N R9W, Section 20, SE 1/4; Section 21, SW 1/4; Section 28, NW 1/4; Section 29, NE 1/4). Other infestations were limited to individual trees or to small groups of trees. Predation by the Twice-Stabbed Lady Beetle, Chilocorus stigma (Say), was observed early in the season, but the beetles were scarce after the scale crawlers emerged. (See map, page 12).

NORTHEAST AREA

Heavy infestations were reported in Florence, Marinette and Oconto Counties. Outbreaks were limited to areas less than an acre in size, or involved a few trees on the fringes of stands. Some young reproduction and a few larger trees of poor quality and vigor have been killed.

WEST CENTRAL AREA

Scattered infested trees appeared to be more numerous in Clark and Jackson Counties than in 1962.


PINE TORTOISE SCALE
1963 Infestation
LAKE
CHEQUAMEGON
BAY
Sand Island
York Island
Raspberry Island
Eagle Island
Pt. Detour
Eagle Bay
Little Sand Bay
CLIFF
Sand Bay
Raspberry Bay
Raspberry Pt.
RED
INDIAN
RESERVATION
Frog Bay
Squaw Bay
Sioktand Bay
Red Cliff Bay
Bays Pt.
Redcliff
Bayfield
Channel
Salmo
Houghton Pt.
Washburn
Barksdale
Benoit
Mason
Grandview
Drummond
Cable
Lake Owen
Namekagon
Port Wing
Moquah
Delta
Iron River
Forest
National
CHEQUAMEGON
RUSSELL
BAYFIELD
CLOVER
BELL
BAYVIEW
PORT WING
ORIENTA
TRIPP
WASHBURN
OULU
BARKSDALE
PILSEN
IRON RIVER
KEYSTONE
EILEEN
HUGHES
DELTA
MASON
KELLY
LINCOLN
DRUMMOND
FRATT
BARNES
CABLE
NAMEKAGON
T-51-N
T-50-N
T-49-N
T-48-N
T-47-N
T-46-N
T-45-N
T-44-N
T-43-N
R-9-W
R-8-W
R-7-W
R-6-W
R-5-W
Town of Lenroot
Town of Spider Lake
Town of Highland
Town of Gordon
Town of Wascott
Town of Barksdale
Town of Iron River
Town of Mason
Town of White River
Towns of Gingles
Town of Orienta
Town of Oulu
Town of Cloverland
SAWYER CO.
DOUGLAS CO.
ASHLAND CO.
BAYFIELD
LEGEND
U.S. & STATE
COUNTY
Town Road
Fire Lane
Railroad
R. R. Abdve - Subway
R. R. Below - Overhead
R. R. Tunnel
Elect. Interurban
State Boundary
County Boundary
Civil Town Bound.
Reservation Limits
Nat. & State Reserves
U. S. Highway Number
State Highway Number
Seaplane Base
Airport
Fish Hatchery
Fair Grounds, Race Track
County Seat
Unincorporated Villages
Church, Religious Institution
Schoolhouse, Educational Inst.
Public Hunting or Fishing Grounds
Hospital
Cemetery
Forest Service Lookout Tower
Forest Ranger Station
Nat. Forest Pub. Camp & Picnic Gr.
State Nursery
Golf Course
State Park
County or City Park
Roadside Park
Institution
Wayside
Cave Farm
WIS. AGRIC. EXP. STA.
Light House
BAYFIELD CO.
STATE HIGHWAY COMMISSION OF WISCONSIN
STATE OFFICE BUILDING
Madison, Wisconsin
SCALE
MILES
Corrected for
JAN. 1964
Compiled from U.S.G.S. Quadrangles
Based on Aerial Photographs

EAST CENTRAL AREA

Infestations were light in the area. Scales were observed on widely scattered trees, and the preferred host was Scotch pine.

- Phenological Notes -

June 3 - Females were full of eggs in Oneida County.
June 19 - Crawlers were observed in Oconto County. Larvae of Chilocorus stigma (Say) were numerous.
October 23 - Parasitized scales were observed in a small area in Clark County.

Pine Bark Aphid - Pineus strobi (Hartig)

Approximately 5,000 white pine seedlings, four to five years old, were severely damaged by this insect in a 10-acre Door County plantation (T29N R27E, Section 30, SWNE). The plantation consists of about equal numbers of white pine, red pine and white spruce.

Balsam Twig Aphid - Mindarus abietinus Koch

This insect has been observed attacking fir and spruce in Wisconsin. Resulting injury consists of curling and roughening of the twigs. Repeated infestations may kill shoots.

A private landowner in Door County, managing natural balsam fir for Christmas tree production, decided to attempt control of the aphid with chemicals after having suffered losses the previous year estimated at $3,000 to $5,000. The owner's decision to use chemical control was made even though there were indications of a possible collapse of the infestation within the year because further damage before a collapse would have added to his losses. The area was treated with one-half pound of parathion per acre, and control achieved was apparently very good. The infestation in adjacent areas collapsed due to natural controls. The treated stand was in the north half of Section 2, T30N R28E.

No problems with this aphid have been encountered elsewhere in the state.

HYMENOPTERA

Introduced Pine Sawfly - Diprion similis (Hartig)

NORTHWEST AREA

Spring populations were low, but second generation sawflies were more numerous in many localities. A late fall without killing frosts extended the feeding period, and some white pines were badly defoliated. However, no mortality was reported. Pupal cases were difficult to find late in the fall, and it appeared that parasitism had destroyed a large number of the larvae.

WEST CENTRAL AREA

Populations remained at low levels. Fall feeding was moderate in all locations checked.

EAST CENTRAL AREA

A light infestation was found in Waupaca County in September. A plantation and windbreak trees were affected in T25N R14E, Section 17, SWSW.

- Phenological Notes -

June 3 - Oviposition observed in Oneida County near Monico Nursery.
June 28 - Defoliation was heavy on roadside and open-grown large white pine trees in Douglas County (T48N R14W, Section 4, SENE, NESE, NWSE).

Red-Headed Pine Sawfly - Neodiprion lecontei (Fitch)

NORTHWEST AREA

A few scattered colonies were reported in Barron, Rusk, Sawyer and Washburn Counties.

NORTHEAST AREA

Surveys conducted during late July and August in plantations which had been infested in previous years, as well as the area in general, indicated that populations were at a low level.

WEST CENTRAL AREA

While more numerous than in recent years, the insect was not troublesome anywhere. Defoliation of scattered jack pine reproduction was observed frequently in Juneau, Wood, Adams and Jackson Counties. Other reports of larvae were received from Trempealeau, Vernon and Buffalo Counties.

EAST CENTRAL AREA

Widely dispersed small colonies were observed in sandy areas. No serious defoliation was reported.

Red Pine Sawfly - Neodiprion nanulus nanulus Schedl

A few colonies were found in Burnett and Washburn Counties. A Columbia County plantation (T11N R9E, S 13, SWSE 1/4) had much lighter defoliation than it had in 1962, and elsewhere in the state no damage was reported.

- Phenological Notes -

June 6 - Larvae were in the late instars.
June 14 - Most larvae had cocooned.
July 2 - Rodents had been feeding on cocoons in the Columbia County plantation. About two-thirds of several hundred cocoons collected had been destroyed by predators.
July 15 - Minute black wasps were emerging in large numbers from apparently sound cocoons collected in Columbia County.

White Pine Sawfly - Neodiprion pinetum (Norton)

Scattered light defoliation was reported from one Trempealeau County plantation and larvae collected July 31 in T19N R8W, S 7, cocooned the next day. A few specimens of larvae were collected in Grant County (T8N R1W) on white pine on July 18, and cocooning of these larvae had occurred by July 21. No other reports of this sawfly were received at the laboratory.

Jack Pine Sawfly - Neodiprion pratti banksianae Rohwer

NORTHWEST AREA

Numerous colonies of larvae were found in Douglas County, but no serious defoliation could be attributed to the insect. Colonies were most numerous where pine tussock moth caused severe defoliation, thus it was difficult to determine how much defoliation was attributable to the sawflies.

NORTHEAST AREA

Populations were very light throughout the area and only a few colonies were observed in Oneida County.

Apparently there is some doubt as to the positive identification of the larvae observed. In the 1962 report they were listed as Neodiprion americanus banksianae Rohwer.

- Phenological Notes -

May 8 - Colonies of larvae first observed in Douglas County.

July 3 - Fifth instar larvae were collected in Oneida County.

Sawfly - Neodiprion virginianus complex

A late summer generation erupted in a small private plantation of jack and red pine in Trempealeau County and completely defoliated the jack pine. A high degree of parasitism appears to have occurred in this generation.

Larch Sawfly - Pristophora erichsonii (Hartig)

NORTHWEST AREA

A few isolated stands in Price and Ashland Counties were severely defoliated this year. Over the remainder of the area little or no defoliation was reported. Parasitism was very high and cocoons were scarce in the fall.

NORTHEAST AREA

Light to moderate defoliation was apparent in some scattered stands in Langlade, Marinette and Oneida Counties. Populations were generally low throughout the area.

WEST CENTRAL AREA

Moderate populations were observed in many tamarack stands. Defoliation on survey plots was estimated at 65% to 75% of available foliage.

EAST CENTRAL AREA

Only scattered light defoliation was observed.

SOUTHERN AREA

Defoliation was negligible.

- Phenological Notes -

July 2 - First and second instar larvae observed in Lincoln County.

Horntail - Xiphydria maculata (Say)

Large numbers of specimens were collected from dead and dying red maple in Outagamie County. The horntails were parasitized by an ichneumonid, Rhysella nitida (Cress.). The species determinations on these two insects were made by specialists in the Insect Identification and Parasite Introduction Research Branch, Agricultural Research Service, Beltsville, Maryland.

LEPIDOPTERA

Fall Cankerworm - Alsophila pometaria (Harris)
Spring Cankerworm - Paleacrita vernata (Peck)

Defoliation of hardwood stands occurred from Portage (Columbia County) northward to about two miles north of Montello (Marquette County) within an area varying in width up to about six miles. North of Montello the infestation crossed Highway 22 from the southwest and partially defoliated the west edge of a woodlot adjoining the highway. Light to moderate defoliation was observed in localized areas in Pepin and Polk Counties.

- Phenological Notes -

May 15 - Cankerworm larvae about 1/4 inch long were feeding on young oak leaves which had attained a length of about one inch in the Town of Lewiston, Columbia County.

May 17 - Areas of infestation mapped in Columbia County on June 20, 1962 were resurveyed. Larvae were observed on black oak, elm, hazel, cherry, locust, box elder, and cottonwood in the Town of Lewiston (T13N R8E)

June 6 - Larvae were near mature and defoliation was near complete near Swan Lake (Columbia County) and in other localized areas in Columbia and Marquette Counties survey on May 17. Predacious beetle larvae were observed attacking cankerworm larvae. A few oaks had produced new buds, and the lower portions of trees hit hard by late May frosts were leafing out again.

June 11 - Spring cankerworm larvae were near mature on lightly-defoliated elms in Interstate Park (Polk County). Parasitized larvae were numerous on oaks near Eagle Peak within the park. A Meteorus cocoon was collected next to a moribund cankerworm larvae.

June 19 - Defoliation in Columbia and Marquette Counties ranged from light to heavy. Cankerworm larvae had disappeared and trees were refoliating.

September 11 - Evidence of previous defoliation was not apparent in Columbia and Marquette stands, except perhaps the leaves were somewhat smaller than on trees which had not been defoliated.

Orange-Striped Oakworm - Anisota senatoria (J. E. Smith)

Heavy feeding was reported on 40 acres of small oak in Waupaca County on August 26 (T21N R13E, Section 30, SESE).

Large Aspen Tortrix - Archips conflictana (Walker)

NORTHWEST AREA

Partial defoliation of some aspen stands in Ashland, Price and Rusk Counties was more spotty and even less severe than it was in 1962.

NORTHEAST AREA

Defoliation was moderate to heavy in scattered aspen stands in western Langlade and eastern Lincoln Counties.

WEST CENTRAL AREA

Moderate defoliation was scattered in Clark, Jackson, Juneau and Wood Counties.

Birch Skeletonizer - Buccalatrix canadensisella (Chambers)

Defoliation was minor in

Larch Casebearer - _____ laricella (Hubner)

Infestations were light in all areas, but specimens could be found with relative ease in Manitowoc, Marquette and Waushara Counties. Larval parasitism ranged from 7% to 40% in Langlade and Forest Counties where heavy larval feeding was observed in a few locations on May 9.

Jack Pine Budworm - Choristoneura pinus (Freeman)

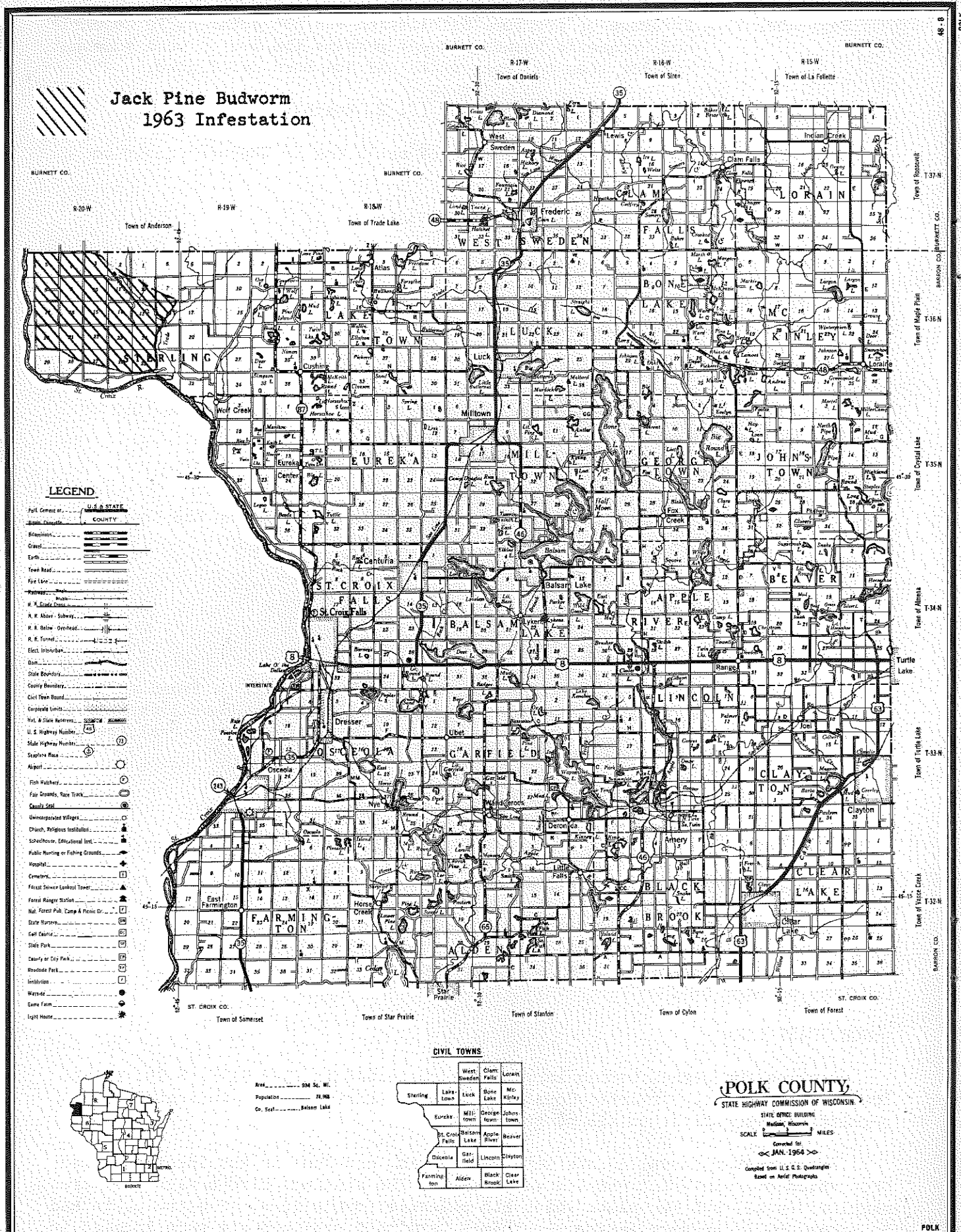
NORTHWEST AREA

Populations were generally low throughout the area, except in the Township of Sterling in Polk County where larvae were numerous enough to severely defoliate some trees. Pupal parasitism in this locality appeared to be quite high, but egg mass counts indicated a somewhat higher overwintering population could be expected. Throughout the remainder of the jack pine type egg masses were scarce.
(See map on page 18).

NORTHEAST AREA

Samples for overwintering larvae were collected in T32N R19E, S 19, in the Town of Stephenson, Marinette County, in March. Larval counts indicated that populations were light on all plots.

Early instar larval counts were made during mid-June in the identical areas from which overwintering samples were taken. The findings agreed with the March sampling on all but two plots which had moderate populations. The two plots had in excess of 10 budworm larvae per thirty terminals examined and were located in areas severely defoliated in 1962.


Jack Pine Budworm
1963 Infestation
POLK
BURNETT CO.
BARRON CO.
ST. CROIX CO.
R-20-W
R-19-W
R-18-W
R-17-W
R-16-W
R-15-W
Town of Anderson
Town of Trade Lake
Town of Daniels
Town of Siren
Town of La Follette
Town of Somerset
Town of Star Prairie
Town of Stanton
Town of Dylon
Town of Forest
Town of Rosstevelt
Town of Maple Plain
Town of Crystal Lake
Town of Almena
Town of Turtle Lake
Town of Vaste Creek
T-37-N
T-36-N
T-35-N
T-34-N
T-33-N
T-32-N
STERLING
WEST SWEDEN
CLAM FALLS
LORAIN
BONNE LAKE
LUCK
MC KINLEY
EUREKA
MILLTOWN
GEORGETOWN
JOHNSTOWN
ST. CROIX FALLS
BALSAM LAKE
APPLE RIVER
BEAVER
LINCOLN
GARFIELD
CLAYTON
FARMINGTON
ALDEN
BLACK BROOK
CLEAR LAKE
Frederic
Luck
Milltown
Centuria
St. Croix Falls
Balsam Lake
Dresser
Osceola
Amery
Deronda
Clayton
Turtle Lake
Clear Lake
Star Prairie
East Farmington
Horse Creek
Little Falls
Wood Grove
Nye
Ubet
Joel
Range
Lewis
Indian Creek
Atlas
Cushing
Wolf Creek
Eureka
Center
Fox Creek
Holcom
Lake O' the Dalles
INTERSTATE
LEGEND
U.S. & STATE
COUNTY
Bituminous
Gravel
Earth
Town Road
Fire Lake
Pathway
R. R. Single Cross
R. R. Above - Subway
R. R. Below - Overhead
R. R. Turned
Elect. Interurban
Dam
State Boundary
County Boundary
Civil Town Bound
Corporate Limits
Fed. & State Reserves
U. S. Highway Number
State Highway Number
Stephens Place
Airport
Fish Hatchery
Fair Grounds, Race Track
County Seat
Unincorporated Villages
Church, Religious Institution
Schoolhouse, Educational Inst.
Public Hunting or Fishing Grounds
Hospital
Cemetery
Forest Service Lookout Tower
Forest Ranger Station
Nat. Forest Pub. Camp & Picnic Gr.
State Nursery
Golf Course
State Park
County or City Park
Roadside Park
Ambulance
Wayside
Game Farm
Light House
CIVIL TOWNS
West Sweden
Clam Falls
Lorain
Sterling
Lakeland
Luck
Bone Lake
Mc Kinley
Eureka
Milltown
George town
Johns town
St. Croix Falls
Balsam Lake
Apple River
Beaver
Osceola
Garfield
Lincoln
Clayton
Farming ton
Alden
Black Brook
Clear Lake
Area ..... 934 Sq. Mi.
Population 28,968
Co. Seat ..... Balsam Lake
POLK COUNTY
STATE HIGHWAY COMMISSION OF WISCONSIN
STATE OFFICE BUILDING
Madison, Wisconsin
SCALE 0 1 2 MILES
Corrected for
JAN. 1964
Compiled from U. S. G. S. Quadrangles
Based on Aerial Photographs
DISTRICTS
METRO.

WEST CENTRAL AREA

Light, general defoliation of jack pine occurred in parts of northern Adams and Juneau Counties. Medium to heavy defoliation occurred on about 600 acres of timber in Armenia Township in Juneau County. Egg mass counts indicated that moderate to high budworm populations may be expected in jack pine areas of northern Adams and Juneau Counties in 1964.

SOUTHERN AREA

A single last instar larva was found on a jack pine twig specimen sent to the Nevin Laboratory from Grant County (T8N R1W, S 10, NESE) on June 8.

- Phenological Notes -

May 7 - First evidence of spring larval feeding noted in Polk County.
May 22 - Most larvae in the second instar. Pollen discharging on some jack pine in Washburn County (T40N R12W, Section 26, SESE).
May 27 - Larvae in the second instar in Marinette County.
May 29 - Most larvae going into the third instar in west central counties.
June 5 - Most larvae in the third instar in Marinette County. Webbing of candles not apparent.
June 7 - Third instar larvae predominant in west central counties, some fourth instars observed.
June 14 - Fourth instar larvae predominant and some fifth instars observed in Marinette County. Webbing of candles appearing.
June 20 - Pupation started in Polk County, defoliation light (T36N R20W, Section 17, NWNE).
July 19 - All eggs observed in Polk County had hatched.

Pine Tussock Moth - Dasychira plagiata (Walker)

High overwintering larval populations were noted in three separate areas in Douglas County (see map on page 22). Collections were made from these areas and the larvae were reared to determine the incidence of parasitism. Meteorus parasites appeared in all the samples, something which did not occur in similar collections made the previous year at the same locations.

Early larval counts in the field indicated that little overwintering mortality had occurred in the three areas. Cocoons of Meteorus appeared in the field as early as mid-May, and as the adults emerged they parasitized additional tussock moth larvae. Calosoma beetles including Calosoma calidum (Fabricius), were very numerous in areas with the most tussock moth larvae by the last week in June and were observed flying from tree to tree. Individual beetles observed destroyed about six tussock moth larvae per day.

In mid-June when most of the tussock moth larvae were in the fourth and fifth instars many species of very active hymenopterous parasites were present in large numbers in the heavily infested areas.

Largely on the basis of apparently intensifying parasite and predator activity, but also on other factors, the decision was made to forego chemical control. In the hardest hit area in T45N R10W, approximately 700 acres of jack pine plantings dating back to about 1936 were severely defoliated during the extremely dry summer. Of the 700 acres, approximately 80 acres in Section 16 sustained extensive tree mortality due to complete defoliation, and salvage operations were begun in the fall.

Although pupal parasitism was high, it did not produce the desired effect on the tussock moth population and oviposition was heavy on about 17,000 acres of young timber. Egg collections and field observations indicated that the egg-hatching success did not exceed 80% and occurred over an extended period. About 10% of the failure was attributed to Trichogramma minutum Riley, and the remainder to nonviable eggs and unidentified causes.

Areas of browned current year's foliage, the result of larval feeding, became increasingly apparent as fall approached, and the areas coincided well with high egg counts made in August.

Mosinee Paper Products Company applied insecticide on August 14 and 15 to nearly 1,000 acres of timber that was hardest hit. DDT was used in an attempt to prevent further loss of foliage to the young larvae which feed for a short while before going into hibernation.

Experimental spraying was done on August 19 by University of Wisconsin entomologists to evaluate fall spraying with phosphamidon and dibrom against the tussock moth. Evaluation of chemical treatments has not been completed.

Earlier in the season, on June 13, experimental spraying of Bacillus thuringiensis Berliner had been tried on small plots of young red pine with mist blowers. Significant results were not obtained.

In one of the three areas mentioned earlier (T43N R13W, parts of Sections 33, 34 and 35), the tussock moth population collapsed during the year. In this locality the problem also appeared to have been centered in a plantation dating back to about 1936 or 1937.

In the third area near Gordon, a relatively high tussock moth population persists where much of the merchantable timber has been removed in recent years. Damage has been confined to killing-back of tops and branches, and little tree mortality.

An area of about 17,000 acres, most of it centering around Sections 16, 17 and 20, in T45N R10W will be considered for chemical control in the spring of 1964 unless the tussock moth population is reduced drastically by natural means.

Tussock moth larvae were scarce in the Bayfield County area treated in 1962.

There was no change in the status of the tussock moth in Marinette County where the populations remained light in the Town of Stephenson.

- Phenological Notes -

April 24 - Larvae were feeding on the larger trees in Douglas County when air temperatures were warm enough to permit movement.
May 16 - Meteorus cocoons were first observed in the field in T45N R10W, S 20, NESE, Douglas County.
May 20 - Second instar tussock moth larvae were predominant and some were in the third instar in Douglas County.
June 13 - Most larvae were in the third instar, and Meteorus cocoons were frequently observed (Douglas County).
June 14 - A few fifth instar larvae were collected in Marinette County.
June 23 - Calosoma calidum (Fabricius) was very numerous in the tussock moth infestation area, and the beetles were observed flying from tree to tree (Douglas County).

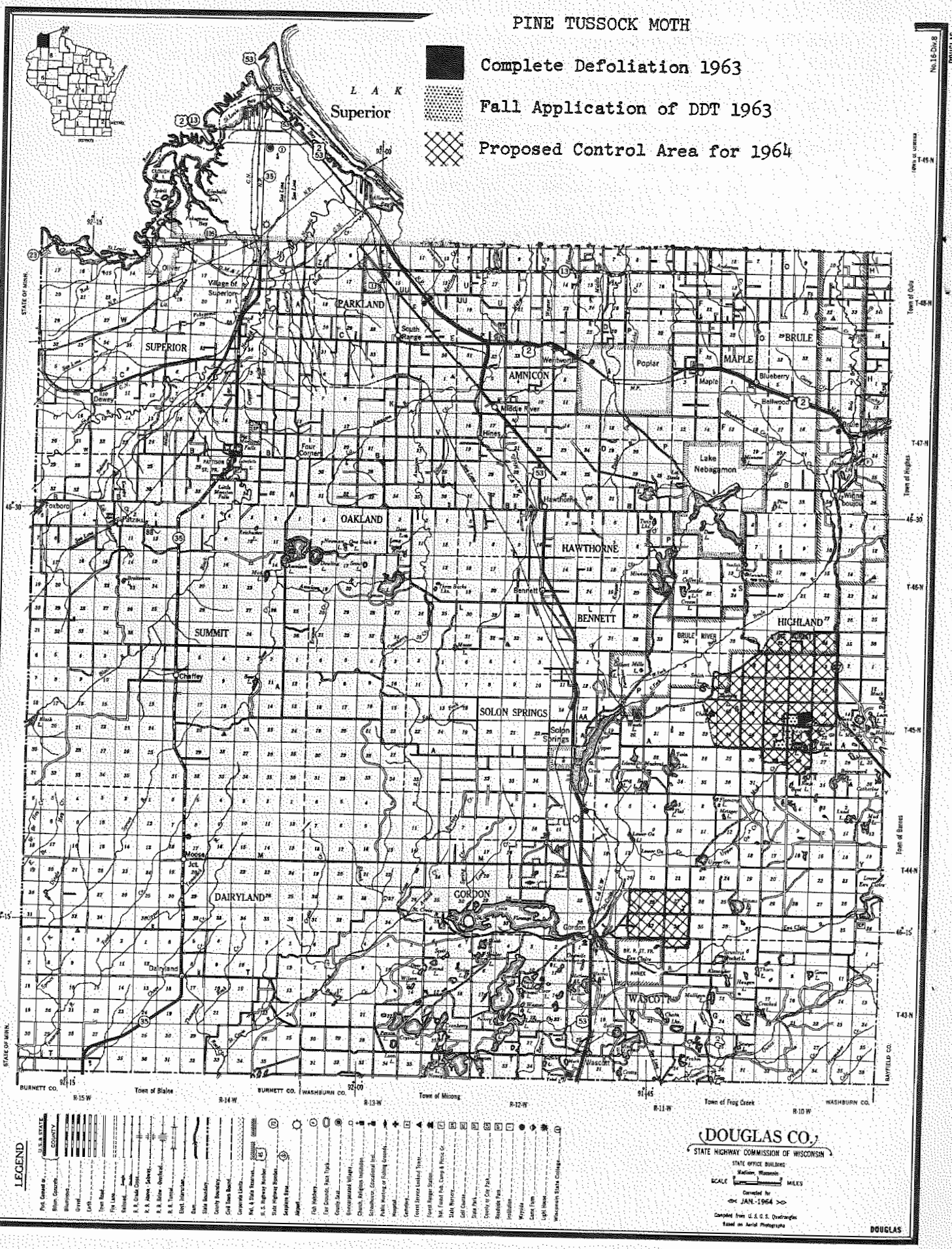
June 28 - Tussock moth pupation started in Douglas County.
July 1 - Second generation Meteorus cocoons were becoming numerous (Douglas County).
July 3 - Many tussock moth larvae were pupating. Calosoma beetles were still active (Douglas County).
July 8 - About 20% of the tussock moth larvae on observation plots were parasitized by Meteorus. Fifty percent or more of the tussock moth pupae appeared to be parasitized in the hardest hit area. In some localities nearly every pupal case contained a dipterous larva (Douglas County).
July 12 - Counts indicated that 60% of the tussock moth larvae had pupated in the Douglas County infestation. A few moths were emerging.
July 14 - A few fifth instar larvae were collected in Marinette County.
July 15 - First tussock moth oviposition was observed in Douglas County.
July 19 - Pupation of tussock moth larvae was complete in Douglas County.
July 20 - First hatching of eggs was observed in Douglas County.
July 26 - July 27, Appeared to be the peak oviposition period in the Douglas County outbreak area.
July 29 - Some third generation Meteorus were observed in Douglas County.
August 7 - About 10% of the egg masses observed in Douglas County had hatched. The count was based on counts of 100 randomly picked egg masses on 100 randomly picked trees in each of four different areas. The range of hatched egg masses was from 9 to 12%. T. minitum Riley were active on many egg masses. Chorions were devoured by hatching larvae on some egg masses. In T45N R10W, S 16, dipterous parasites were still observed in tussock moth pupal cases, and flies resembling Sarcophaga aldrichii Park, made a nuisance of themselves.
August 13 - Egg masses collected in Douglas County on August 7 finished hatching in the Laboratory. Of 45 egg masses collected, three failed to produce larvae, T. minitum Riley emerged from four masses, and nearly all of the eggs in the remaining 38 egg masses hatched. As larvae left the eggs in several masses they immediately began consuming the shells as they had been observed to do in the field on August 7. Early hatching larvae were observed to open a few adjoining eggs in the egg mass from the outside.
August 14 - Hatching of eggs in areas set up for test spraying in Douglas County did not exceed 50%.
September 11 - A few tussock moth larvae were still feeding; some were in the third instar. A Meteorus larva suspended from a twig was observed spinning a cocoon in Douglas County.

Zimmerman Pine Moth - Dioryctria zimmermani (Grote)

Shoot damage was prevalent on red pine in parts of Douglas and Bayfield Counties. Damage was also observed in scattered Scotch and red pine plantings in the central and southern counties. In the East Central Area damage appeared to be confined largely to sheared Scotch pine. Some southern red and Scotch pine plantings were infested, and a sheared Scotch pine Christmas tree planting in Iowa County was more heavily infested than other plantings in the vicinity.

The insect was less troublesome in the West Central Area than it was in 1962 but some damage to Scotch pine occurred in Christmas tree plantings in Juneau and Wood Counties.

Chemical control tests started in the West Central Area in 1962 were continued.


PINE TUSSOCK MOTH
Complete Defoliation 1963
Fall Application of DDT 1963
Proposed Control Area for 1964
Superior
PARKLAND
SUPERIOR
AMNICON
MAPLE
BRULE
OAKLAND
HAWTHORNE
BENNETT
HIGHLAND
SUMMIT
SOLON SPRINGS
DAIRYLAND
GORDON
WASCO
Lake Nebagamon
Village of Superior
Town of Bennett
Town of Maple
Town of Oakland
Town of Parkland
Town of Superior
Town of Amnicon
Town of Hawthorne
Town of Highland
Town of Solon Springs
Town of Dairyland
Town of Gordon
Town of Wascott
Town of Blaine
Town of Maple
Town of Frog Creek
BURNETT CO.
WASHBURN CO.
DOUGLAS CO.
BAYFIELD CO.
STATE OF MINN.
LEGEND
DOUGLAS CO.
STATE HIGHWAY COMMISSION OF WISCONSIN
STATE OFFICE BUILDING
Madison, Wisconsin
SCALE
MILES
Corrected for
JAN. 1964
Compiled from U. S. G. S. Quadrangles
Based on Aerial Photographs
DOUGLAS

Saddled Prominent - Heterocampa guttivitta (Walker)

Defoliation observed on nearly 200 acres of beech and maple on Chambers Island (Door County) late in the summer was tentatively attributed to this species. Pupal collections were made on October 10 to rear moths for identification. About 100 pupae were collected throughout the area of defoliation from the leaf litter and dissection of a few indicated that some of the moths were nearly completely formed. On October 25 three moths emerged. Identification is pending.

Forest Tent Caterpillar - Malacosoma disstria (Hubner)

An unconfirmed report of a colony of larvae was received from Bayfield County. The reported location was three miles west of Iron River along U.S. Highway 2. Fall and early winter egg mass surveys in the northern counties did not reveal any new egg masses.

European Pine Shoot Moth - Rhyacionia buoliana (Schiffermuller)

The 1963 population in the eastern counties was low following the severe winter of 1962-1963. Plantation owners were advised to handpick their infested trees to further reduce the low population.

Olethreutid - Rhyacionia sp. (not buoliana or neomexicana. Close to frustrana and bushnelli, but not typical)

Larvae were collected from red pine buds in late June at Wautoma, Waushara County, at several locations. Specimens were sent to the Agricultural Research Laboratory at Beltsville, Maryland, for identification.

Red-Humped Mapleworm - Symmerista leucitys Francelmont

No larvae were found in the vicinity of Big Lake in Vilas County, the site of the outbreak in 1961 and where only a few larvae were found in 1962. Reexamination of permanent plots revealed no increase in tree mortality since the previous year's evaluation.

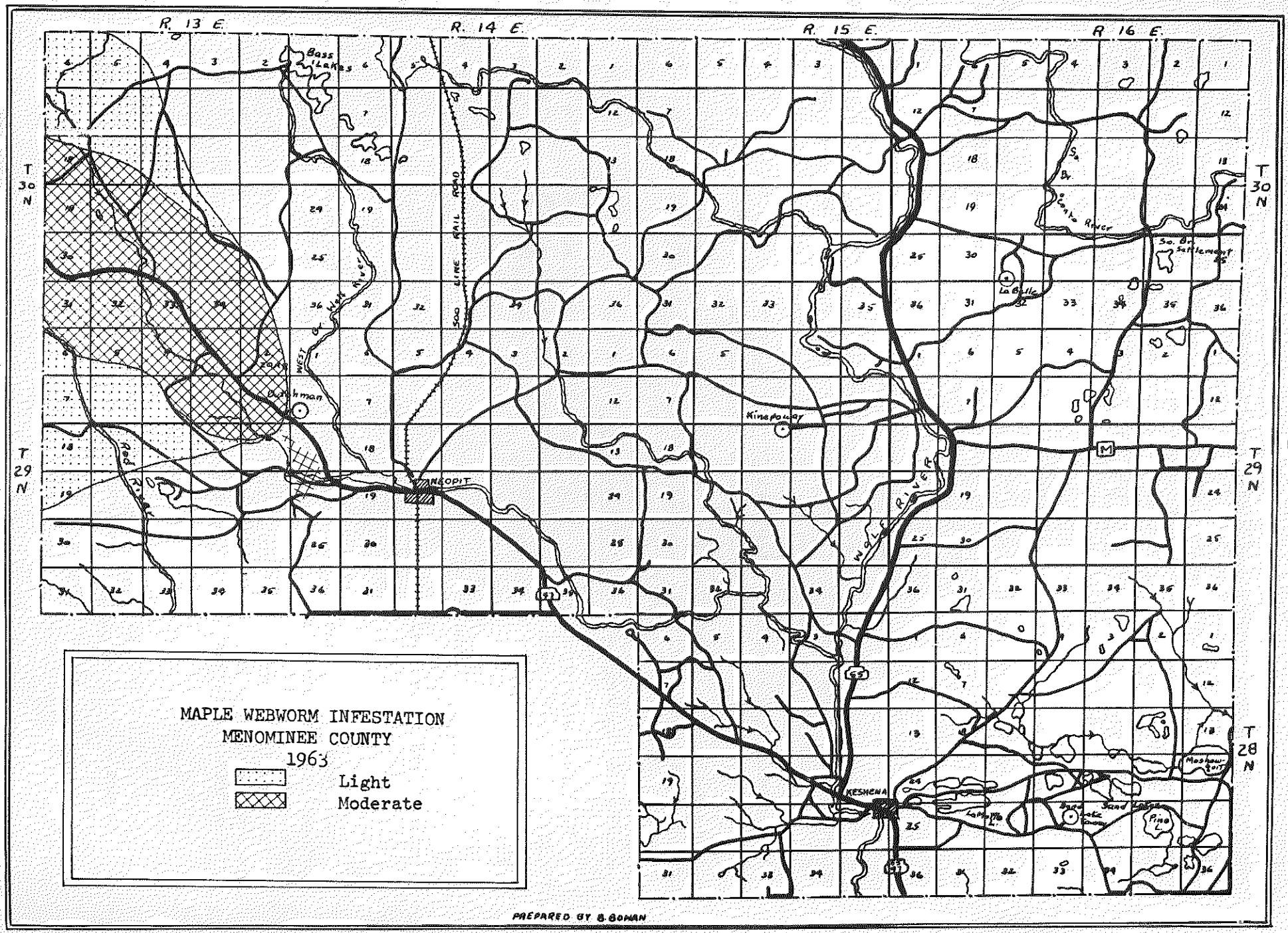
No larvae were found in other areas which had been infested in preceding years.

Maple Blight Associates - Acleris chalybeana (Fernald)
Sparganothis acerivorana (McKay)
Tetralopha sp. near asperatella

Moderate populations of leaf rollers were present in hardwood stands in northwestern Menominee County in the identical area which had been heavily defoliated by maple webworms in 1957. Moderate populations of webworms appeared in the area following the leaf rollers. By mid-September light defoliation was discernible over an area of approximately 2,000 acres, and in a few scattered patches defoliation was classified as severe. (See map on page 24).

- Phenological Notes -

July 18 - Eggs of Tetralopha were commonly observed in rolled leaves.
August 9 - Tetralopha larvae were in the second instar.


R. 13 E.
R. 14 E.
R. 15 E.
R. 16 E.
T 30 N
T 29 N
T 28 N
Bass Lake
West Branch River
Soo Line Rail Road
Bush man
Red River
Niagara
Kingsford
Menominee River
Peshtigo River
La Belle
So. Branch Settlement
Keshena
Sand Lake
Pine Lake
MAPLE WEBWORM INFESTATION
MENOMINEE COUNTY
1963
Light
Moderate
PREPARED BY B. BOMAN

ORTHOPTERA

Walkingstick - Diapheromera femorata (Say)

The behavior of walkingsticks in Marinette County, and elsewhere in Wisconsin, continues to be interesting and unpredictable, although bits of information accumulating from observations made each year are helping us to understand it better.

Populations were high in parts of the Towns of Beaver and Stephenson in the same general areas where they had been high in 1961. However, the acreage of moderate to severe defoliation of timber discernible from the air approximated 10,000 acres, or about 1/4 that of 1961. An area of defoliation appeared just east of U.S. Highway 141 in T32N R20E, Section 27, SWSE, and in Sections 15 and 22, where it had not been observed previously.

Expected severe defoliation, based on egg counts made on permanent plots in 1961, did not materialize at all plot locations. In many areas where complete defoliation was anticipated, it was only light to moderate. In comparing maps of 1959, 1961 and 1963 defoliation in Marinette County, it is quite apparent that areas of walkingstick activity have shifted considerably.

Hot, dry weather in June did not appear to have an appreciable effect on the hatching success in Marinette County. Newly-hatched walkingstick nymphs, and those of the post oak grasshopper, were observed emerging from the ground litter early in June and migrating up the stems of shrubs and trees into the crowns. This observation led to an attempt to keep the insects out of the trees by the use of sticky bands of tanglefoot and axle grease applied to the boles. It appeared that this might be a workable solution to keeping the pests out of ornamental trees in yards, where crowns of the ornamental trees did not intermingle with those of trees in adjoining infested woodlots. Tanglefoot worked best, and it was necessary to apply a fresh band periodically because insects stuck in the bands eventually provided a bridge for those which were following.

Caged walkingsticks in the Laboratory at Nevin Hatchery provided some data which, although not necessarily comparable to that obtained in the field, provided information on longevity of the egg production period and on the fecundity of the females. Single pairs of mature females and males, reared from eggs in the Laboratory or from field collected nymphs, were placed in individual cages before mating had occurred and the females produced eggs as follows:

Female No.	Number of Eggs	Number of Days	Range of No. Eggs/Day	Average No. Eggs/Day
1	56	21	0 - 5	2.7
2	116	35	0 - 7	3.3
3	126	37	0 - 8	3.4
4	177	54	0 - 7	3.3

All but the first female outlived two or more males caged with them during the period of egg production.

Means of evaluating egg production in the field and its relationship to successive populations, and defoliation and damage, are being investigated.

Male walkingsticks outnumbered females in September in three separate areas - Marinette County, Menominee County and Eau Claire County. Counts indicated that females constituted from 25% to about 50% of the population in each of the infestations. The ratio of males to females was about 3:1 in some Marinette County plots in 1961.

Defoliation in Menominee County in 1963 was severe on 1,200 acres of timber compared to 2,900 acres in 1961.

Areas in Marathon County which had been heavily defoliated in 1961 were reduced to small scattered patches of light to moderate defoliation.

In Eau Claire County defoliation was moderate, but heavier than in 1962.

A 30-acre patch of oak timber in Buffalo County (T23N R10W, Section 17, SWNW), was reported to have a heavy infestation of walkingsticks. This location has not been recorded previously.

- Phenological Notes -

June 5 - Walkingsticks eggs were hatching in the Town of Stephenson, Marinette County. Nymphs were crawling up out of the litter on to blades of grass and other vegetation to pause while they "hardened" and then proceeded up the stems of hazel and oak to feed. Humidity was high and temperature in the mid-80's. Oak grasshopper eggs were hatching at the same time.

June 11 - Nymphs observed in Marinette County were up to 1" long.

June 18 - Most nymphs in the Town of Stephenson, Marinette County, were in the second instar. Where hazel underbrush was sparse, or absent, mostly first instar nymphs were observed. The insects were migrating up the tree trunks.

July 18 - Nymphs were in the third to fifth instars in Menominee County, and appeared to be ahead in development of those in Marinette County.

August 8 - Most walkingsticks appeared to be mature in Marinette and Menominee Counties. Mating pairs were observed, but no oviposition noted.

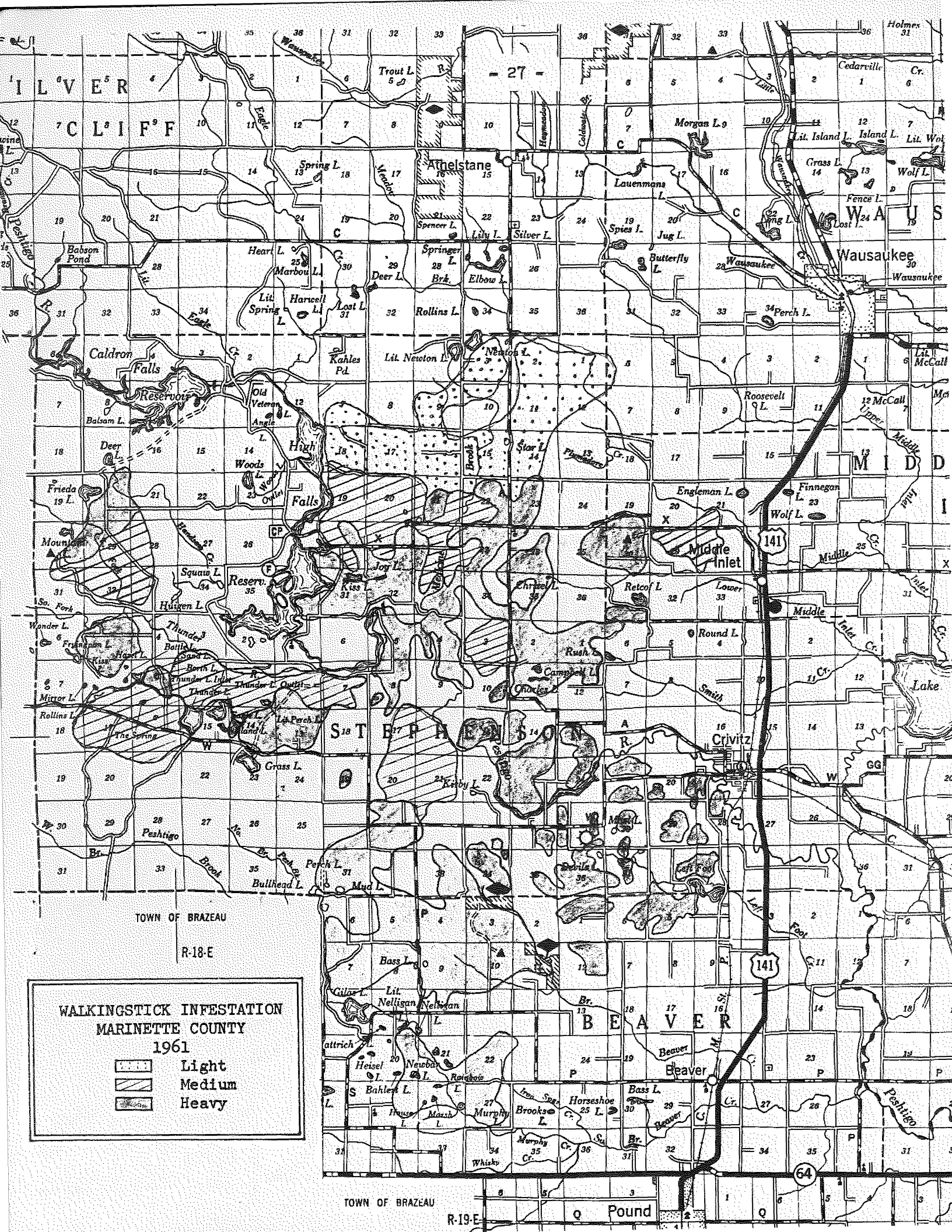
August 29 - Heavy oviposition in the Town of Stephenson, Marinette County.

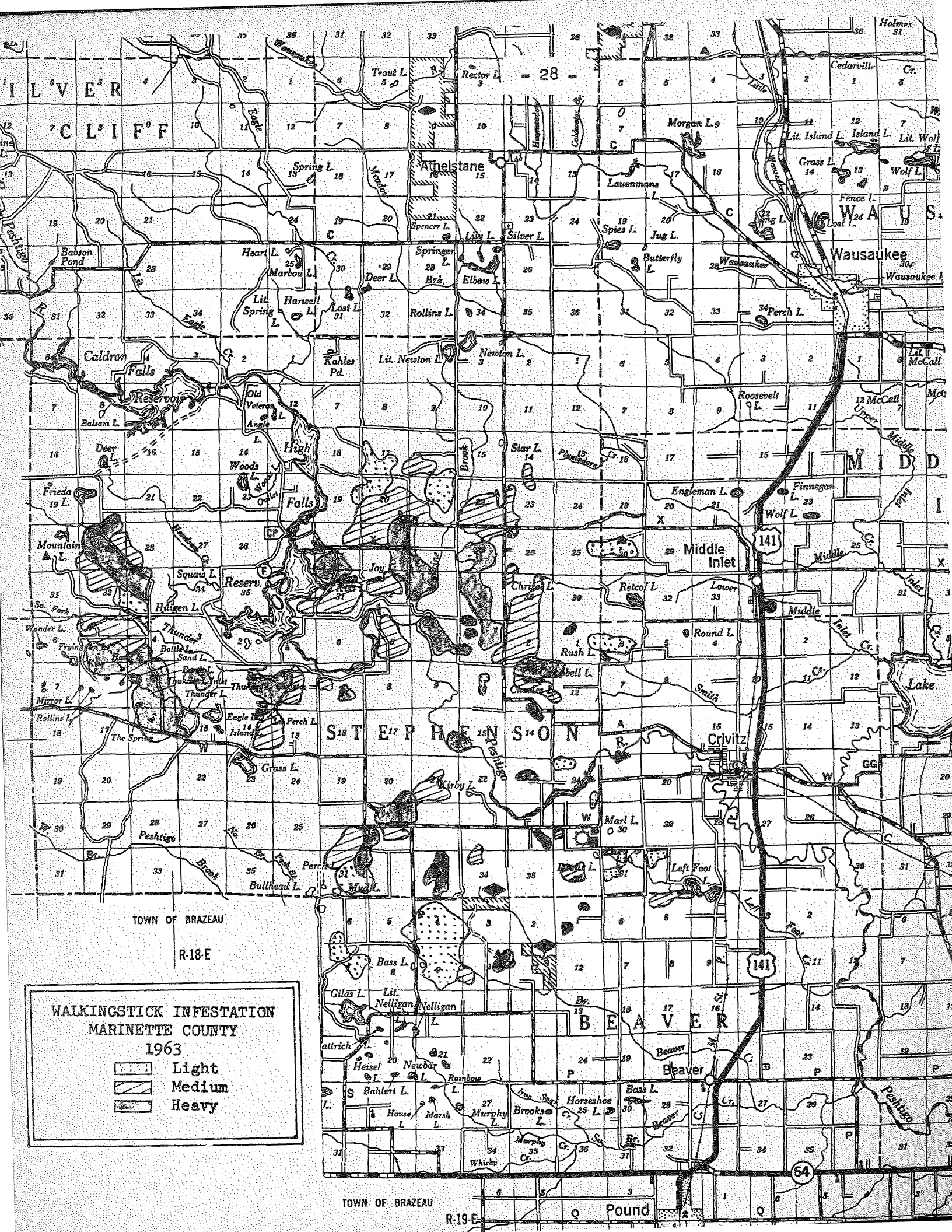
September 5 - A few immature walkingsticks observed in Marinette County, a pale green fourth instar nymph was collected. Twenty-five percent to about 50% of the walkingsticks were females on several plots examined. Paired insects were numerous, but eggs observed in open areas under the tree canopy were few.

Post Oak Locust - Dendrotettix quercus Packard

This grasshopper was abundant in the Towns of Beaver and Stephenson within the same areas as the walkingstick. In some stands grasshoppers worked alone and resulting defoliation ranged from moderate to severe. However, in several stands where the grasshoppers were feeding with walkingsticks, defoliation was complete. Large pentatomids which were active against the grasshoppers in Marinette County in 1961 were not observed in 1963.

Oaks in eastern Jackson County and parts of Adams, Juneau, Monroe and Wood Counties were heavily infested in June, but in July and August the numbers dropped after causing noticeable but not severe defoliation.


- 27 -
SILVER CLIFF
WAUSAUKEE
MIDDLE INLET
STEPHENSON
BEAVER
Athelstane
Crivitz
Wausaukee
Middle Inlet
Caldron Falls Reservoir
High Falls
Squaw L. Reserv.
Pound
TOWN OF BRAZEAU
R-18-E
R-19-E
WALKINGSTICK INFESTATION
MARINETTE COUNTY
1961
Light
Medium
Heavy


WALKINGSTICK INFESTATION
MARINETTE COUNTY
1963
Light
Medium
Heavy
TOWN OF BRAZEAU
R-18-E
TOWN OF BRAZEAU
R-19-E
- 28 -
Athelstane
Wausaukee
Middle Inlet
Crivitz
Beaver
Pound
Caldron Falls Reservoir
Peshtigo
Lauenmans L.
Spies L.
Jug L.
Butterfly L.
Perch L.
Newton L.
Lit. Newton L.
Rollins L.
Roosevelt L.
Engleman L.
Finnegan L.
Wolf L.
Retcof L.
Rush L.
Round L.
Kirby L.
Marl L.
Left Foot L.
Bass L.
Gilas L.
Lit. Nelligan
Nelligan L.
Heisel L.
Newbar L.
Bahlert L.
Horseshoe L.
Brookes L.
Murphy L.
Marsh L.
House L.
Rainbow L.
Trout L.
Rector L.
Morgan L.
Grass L.
Fence L.
Lost L.
Silver L.
Springer L. Brs.
Elbow L.
Deer L.
Marbou L.
Harwell L.
Lit. Spring L.
Babson Pond
Kahles Pd.
Old Veteran L.
Angle L.
High L.
Woods L.
Frieda L.
Deer L.
Balsam L.
Mountain L.
Squaw L.
Huigen L.
Thunder L.
Bottle L.
Sand L.
Mirror L.
Rollins L.
Grass L.
Bullhead L.
Perch L.
Mudd L.
Star L.
Christie L.
Joy
Reserv.
Owen L.
Wonder L.
Island L.
Eagle L.
Spring L.
Meadow
Eagle
Wausaukee
Little
Cedarville Cr.
Lit. Island L.
Island L.
Lit. Wolf
Wolf L.
Lit. McCall
McCall
Upper Middle
Middle Inlet Cr.
Lower Middle Inlet Cr.
Lake
Smith
Left Foot
Beaver
Peshtigo
Brook
Br.
Pesh. Br.
No. Br.
So. Fork
Frying Pan
Thunder Inlet
Thunder
The Spring
Whisky Cr.
Murphy Cr.
Iron Sand Cr.
Beaver Cr.
Peshtigo
Holmes
Cr.
Br.
St.
Pkwy
Ln.
Rd.
Cr.
141
64
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S T E P H E N S O N
B E A V E R

- Phenological Notes -

June 5 - Grasshopper eggs were observed hatching in Marinette County. Nymphs were emerging from the litter and climbing into the shrubs and trees.

June 11 - Nymphs about 3/8 inch long were observed in T32N R20E, Sections 21 and 33, and in T32N R18E, Section 16.

June 18 - Nymphs were mostly in the second instar with a few first and some third instars observed in Marinette County.

August 8 - Most grasshoppers were near mature and oviposition had started in Marinette County.

August 29 - Grasshoppers were ovipositing in Marinette County.

September 5 - Paired grasshoppers were numerous on the oaks in Marinette County, and moving up and down on the tree trunks. Short and long-winged forms were observed. Several dead grasshoppers were observed clinging to shrubs, apparently killed by a fungus.

AERIAL APPLICATION OF INSECTICIDES

A review of records on aerial application of insecticides for forest pest control in Wisconsin indicated that much of the work has been done on a relatively small portion of the 15 1/2 million acres of forested lands. Most of the acreage treated has been in a pine belt of variable width and continuity which extends from the northwest corner of Polk County northeastward into the Bayfield County peninsula. Some of the largest, almost uninterrupted expanses of pine cover lie in southeastern Douglas County and adjoining west central Bayfield County (see map on page 31).

The trees consist mostly of natural and plantation jack and red pine which reflect the extremely rigorous as well as the favorable growing conditions encountered in this region of sandy soils. Some of the plantations date back to the early 1930's.

Insects of one kind or another have been troublesome somewhere in the pine belt almost every year. The most injurious pests have been the jack pine budworm and pine tussock moth from the standpoint of damage to timber and expenditure of control funds. Less troublesome, but sometimes damaging in more localized areas have been the pine tortoise scale, black pine leaf scale, various sawflies, the root collar weevil, bark beetles, pitch midges, and others.

DDT applied at the rate of one pound per gallon per acre has been the principal insecticide used for control of forest pests in Wisconsin.

Tables 1 and 2 on pages 32, 33, and 34 indicate counties where insecticides have been applied by aircraft since 1956, the insects controlled, acreage treated, and the distribution of control costs. The recurring need for insecticidal treatment of a few specific areas suggests that more intensive study of them is required.

Control of forest pests is based on the best current information available, but an urgent need exists to expedite the search for the basic causes of our serious tree problems, and the search for knowledge which will permit more exacting use of the various kinds of pest control at our disposal, either singly or as integrated controls. Lands treated in past years provide an excellent opportunity to obtain valuable information on the fate of the chemicals that have been used and their impact on the forest.

Greater justification for chemical control of forest pests, from the standpoints of biology and economics, will be required as repeat treatments are made on some areas and as cost of treatment rises.

MAJOR PINE AREAS IN WISCONSIN
BAYFIELD
DOUGLAS
ASHLAND
IRON
VILAS
BURNETT
WASHBURN
SAWYER
PRICE
FOREST
FLORENCE
ONEIDA
POLK
BARRON
RUSK
MARINETTE
LINCOLN
LANGLADE
TAYLOR
OCONTO
CHIPPEWA
ST CROIX
DUNN
MARATHON
MENOMINEE
DOOR
CLARK
PIERCE
EAU CLAIRE
WOOD
PORTAGE
WAUPACA
BROWN
KEWAUNEE
OUTAGAMIE
PEPIN
BUFFALO
TREMPEALEAU
MANITOWOC
JUNEAU
WINNEBAGO
CALUMET
LA CROSSE
MARQUETTE
GREEN LAKE
FOND DU LAC
SHEBOYGAN
VERNON
SAUK
DODGE
RICHLAND
WASHINGTON
OZAUKEE
CRAWFORD
DANE
IOWA
JEFFERSON
WAUKESHA
MILW
GRANT
GREEN
ROCK
WALWORTH
RACINE
LA FAYETTE
KENOSHA

Table 1

Aerial Application and Insecticide Cost Summary
1956 - 1962

Year	Insect	Counties	Acres	Cost per Acre	Cost Sharing		Owner	Total Cost
					State	Federal		
1956	Jack pine budworm	Douglas	21,~~690~~ 960	$1.37	$ 9,165.30	$	$20,929.13	$30,094.43
	Saratoga spittlebug	Vilas	351	1.94	683.94			683.94
1957	Jack pine budworm	Bayfield, Burnett, Douglas, Oneida, Polk, Washburn	26,170	2.65 (Actual) 1.24 (Contract)	48,077.30	17,319.34	3,880.70	69,277.34
	Saratoga spittlebug	Douglas, Florence, Langlade, Marathon, Marinette, Oconto	4,032	2.30	5,539.55		3,734.05	9,273.60
1958	Saratoga spittlebug	Florence, Lincoln, Marinette, Oconto, Price, Vilas	1,271	2.35	2,569.33		481.76	3,051.09
1959	Saratoga spittlebug	Florence, Marinette, Oconto, Oneida, Vilas	1,534	1.97	2,617.14		404.84	3,021.98
1960	Saratoga spittlebug	Florence, Marinette, Oconto, Oneida, Vilas	1,599	1.98	2,384.91		781.11	3,166.02

Table 1 (cont.)

Year	Insect	Counties	Acres	Cost per Acre	Cost Sharing State	Federal	Owner	Total Cost
1961	Jack pine budworm	Bayfield, Burnett, Douglas, Washburn	32,872	$1.19[8]	$23,690.40	$	$15,756.00	$ 39,446.40
	Saratoga spittlebug	Florence, Marinette Oconto, Oneida Vilas	1,485	1.86	2,089.71		672.39	2,762.10
1962	Pine tussock moth	Bayfield, Douglas	13,140	.59[8] (Application) .48 (DDT)	5,806.52	3,559.69	4,872.53	14,238.74
1963	Saratoga spittlebug	Marinette, Oneida	755	2.24	1,254.40		436.80	1,691.20
	Subtotals Saratoga spittlebug		11,027		$ 17,138.98		$ 6,510.95	23,649.93
	Grand Totals		104,899		$103,878.50	$20,879.03	$51,949.31	$176,706.84

1964 Pine Tussock Moth Douglas Co. 8,317 1.93 50% 25% 22% $16,057.81

113,216 $192,758.65

Extra 3% = Landowner local fund.

Table 2

Acreage Treated by Aircraft 1956-1963
by Counties

YEAR	Douglas	Bayfield	Burnett	Oneida	Marinette	Washburn	Polk	Vilas	Florence	Oconto	Lincoln	Price	Marathon	Langlade	Total A. for Yr.
1956	21,690							351							22,041
1957	3,048 (2,895+153)	3,100	6,645	7,400	2,489	1,840	4,290		615	623			90	62	30,202
1958					359			220	121	120	311	140			1,271
1959				12	571			822	67	62					1,534
1960				90	849			330	260	70					1,599
1961	18,683	9,890	1,655	391	662	2,644		325	67	40					34,357
1962	7,800	5,340													13,140
1963				190	565										755
Totals	51,221	18,330	8,300	8,083	5,495	4,484	4,290	2,048	1,130	915	311	140	90	62	104,899

1964 8,317
1965 160
1966 180
82,478 (65)

MAJOR FOREST DISEASES

WILTS AND DIEBACKS

Oak Wilt - Ceratocystis fagacearum (Bretz) Hunt

Oak wilt continued to spread on northern pine and black oak sites, with pockets enlarging 1-2 tree depths per year. Surveys conducted by the Lake States Forest Experiment Station in central Wisconsin indicate that for each 100 acres of oak type there are 1.7 new infection centers annually.

Additional work was done on a previously established oak wilt control demonstration plot near Elkhorn in Walworth County. Trees were poisoned and girdled and vapam barriers established.

Oak Dieback - unknown

Oak twig and branch mortality was reported in Burnett, Polk, Rusk and Sawyer Counties. Several different species of fungi were present on affected branches and are being identified. Drought conditions and low water table may have contributed to the dieback condition.

Maple Dieback - unknown

In Rusk County, T36N R8W, S 15, SESE, a 3-acre pocket of hardwood, predominately maple, was dying or dead. No apparent cause could be found, again dry conditions and low water table may be of significance.

Ash Dieback - unknown

Several reports of black ash dying have been received from observers in Lincoln, Marathon and Vilas Counties.

Dutch elm disease - Ceratocystis ulmi (Buisman) Moreau

Dutch elm disease is now found in 34 of Wisconsin's 72 counties. The disease is at its greatest intensity in southeastern Wisconsin and continues to spread north and west. The disease is found south of an area bounded by Green Bay, Stevens Point, Marshfield, Neillsville and La Crosse. Maps showing the known occurrance of Dutch elm disease in Wisconsin may be found in Wisconsin Department of Agriculture's "1963 Dutch Elm Disease Report and Conference Summary".

Balsam Fir Dieback - Valsa abietis Fr.

A 20-acre balsam fir Christmas tree plantation in Langlade County, T31N R12E, S 8, had present a small number of trees with dieback. Symptoms were the same as those described by Raymond and Reid in Ontario. Laboratory diagnosis revealed that Valsa abietis was present in the cankered areas. It appears that dry conditions, adverse site and wood borers may have contributed to disease development. Although limited in distribution this situation bears watching because of the previous reports of extensive balsam fir dieback in Wisconsin and Minnesota during the dust bowl years (1933-35).

ROOT AND BUTT ROTS

Nursery Root Rot - Cylindrocladium scoparium Morgan

This disease which causes damping off, root rot, shoot wilts and needle blight of pines and spruces has been found in all of Wisconsin's forest tree nurseries. Trials conducted by J. G. Berbee and R. Johnson of the University of Wisconsin at Griffith and Hayward Nurseries established that the damping off and root rot stages could be controlled with "Mylone", "Vorlex" or "Trizone". The University experiments also showed that mortality at the time of transplanting can be reduced by dipping the roots in captan or in various mercurial fungicides.

Annosus Root Rot - Fomes annosus

To date Fomes annosus root rot has not been found in Wisconsin. One means of detecting the fungus is by trapping spores in the air and culturing the fungus on discs cut from young pine trunks which act as a selective medium for the fungus. In each of the five survey areas freshly cut pine discs were exposed weekly from May-June and September-October for periods of 8 - 24 hours. These discs were then incubated at room temperature for ten days in polyethylene bags. The discs supported fungal growth of organism such as Peniophora, Alternaria, Aspergillus, Trichoderma, and Penicillium but no Fomes annosus was detected.

Plantation Root Rot - Polyporus schweinitzii Fr. and Polyporus tomentosus Fr.

Two species of root rotting fungi were found in a 38 year old white spruce planting near Keshena in Menominee County. A survey by the University of Wisconsin showed that both Polyporus schweinitzii and Polyporus tomentosus were present. Approximately 15 root rot infection centers were located on the basis of presence of fruiting bodies. Location of sporophore were marked and permanent plots established to provide information on disease spread.

Shoestring Root Rot - Armillaria mellea Valh. ex. Fr.

This disease continues to kill individual and small groups of pine throughout the state, especially where conifers have been planted among hardwoods or on former hardwood sites.

Notes: Sporophores were first noticed on September 9 on the forest floor and at the base of oak stumps in Dane County (Madison School Forest). Fruiting bodies were observed at the base of 8 year old red pines on October 4 in Sauk County.

TRUNK ROTS

Red Rot or Red Ring Rot - Fomes pini (Thore) Lloyd

This fungus which is the major cause of decay of white pine in Menominee County was also found fruiting on white spruce near Keshena. Within a 38 year old plantation many small and suppressed trees were infested. Several of the trees were not larger than two inches dbh.

Brown Cubical Sap Rot - Merulius sp.

This fungus appears to be a major wood invader on scale killed jack pine in Polk County. Jack pine killed by black pine leaf scale in 1960 and pine tortoise scale in 1961 had present on the bark numerous fruiting bodies of the fungus.

STEM AND BRANCH DISEASES

White Pine Blister Rust - Cronartium ribicola Fischer

Phytoactin plots in Waushara County established in 1961 were examined in 1963. Results of the trails were difficult to evaluate but there was a definite reduction in aecial production on cankers treated with Phytoactin L-440. Additional Phytoactin plots were established in Clark County using a basal spray of Phytoactin L-439 and L-440.

Notes: Aecial production was first noticed on April 18 in Dane County and on April 29 in Waushara County.

FOLIAGE DISEASES

Anthracnose - Gnomonia sp.

Symptoms were occasionally observed on white oak and sycamore. Severity ratings for the past four years are: 1960 - heavy; 1961 - moderate; 1962 - very light; 1963 - very light.

Pine Needle Blight - Dothistroma pini Hulbray

This disease has not been previously reported in Wisconsin. In the past year several reports of defoliation by Dothistroma pini were received. In Waushara County, 18,000 Austrian pine Christmas trees were damaged. At the Green Acres Nursery in Jackson County, 2-3 acres of Austrian pine were damaged. A subsequent check of some Austrian and ponderosa pine plantations in Wisconsin revealed that the disease is widely spread and has been present for many years. The disease was not found on Scotch or red pine.

Plantations from where the disease has been identified are as follows:

County	Legal Description	Host
Dane	T6N R7E, S 10	Ponderosa pine
Grant	T6N R6W, S 27	Ponderosa pine
Iowa	T6N R5E, S 23, SE 1/4	Austrian pine
Jackson	T22N R5W, S 27	Austrian pine
Kenosha	T1N R21E, S 32	Austrian and Mugo pine
Milwaukee	T6N R21E, S 32	Austrian pine

Pine Needle Rust - Coleosporium solidaginis (Schw.) Thuem.

For the past two years locations and dates of aecial fruiting were recorded by Department foresters. The data has made available to the University of Wisconsin and the Lake States Forest Experiment Station for use in an epidemiological study. The disease has been reported on red pine in 50 counties and on jack pine in six counties.

Notes: Aecia were first observed on May 12 in Monroe County. Maximum aecial formation occurred the last week in May and the first week in June as it did in 1962.

OTHER DISEASES REPORTED:

Host	Fungus
Aspen	Hypoxylon pruinatum (Kl.) Cke.
Black Oak	Fomes everhartii (Ell. & Gall.) v. Sch.
Jack Pine	Cronartium cerebrum Hedge & Long
Jack Pine	Cronartium comptoniae Arth.
Jack Pine	Hypodermella ampla (Davis) Dearn.
Red Cedar	Gymnosporangium juniperi-virginianae Schw.
Sugar Maple	Eutypella parasitica Dav. & Lor.